Researchers unlock bacteria's beneficial side

November 28 2011

Researchers now understand how bacteria can break down phosphonic acids, persistent and potentially hazardous environmental pollutants found in many common medicinal products, detergents and herbicides.

"We've achieved a critical step that has evaded other research groups for nearly 50 years," says David Zechel, a professor in the Department of Chemistry and an expert in enzyme catalysis. "Having successfully identified the proteins that are needed to break down these molecules, we can finally examine how this reaction actually works and engineer specialized bacteria in the lab to render these compounds harmless."

The stability of phosphonic acids means that these compounds do not easily break down in nature. However, certain bacteria manage to break down these bonds in related molecules with surprising ease. The team successfully identified a complex of proteins that is believed to perform the key bond-breaking step.

It is estimated that more than 20,000 tonnes of phosphonic acids are released annually into the environment in the Western Hemisphere. Many of these end up as contaminants in groundwater, leading to concern over their impact on human health and aquatic life.

This research was conducted by Queen's Chemistry graduate student Fern R. McSorley in collaboration with Bjarne Jochimsen (Department of Molecular Biology, Aarhus University) and Bjarne Hove-Jensen (Department of Biology, University of Copenhagen).

The findings were recently published in the Proceedings of the National Academy of Sciences.

Provided by Queen's University